

What is Claimed Is:

1. An LGA interconnect, comprising a substrate and a plurality of contact assemblies, said substrate having a plurality of apertures therethrough arranged in an array, each said contact assembly comprised of at least one metal contact and an insulative member, said insulative member being positioned in said aperture, positioning a first contact member of said metal contact above said substrate and a second contact of said metal contact below said substrate, said insulative member isolating said metal contact from said substrate.

2. The LGA interconnect of claim 1, wherein said insulative member is attached to said metal contact.

3. The LGA interconnect of claim 2, wherein said insulative member is overmolded on said metal contact.

4. The LGA interconnect of claim 2, wherein said substrate is rigid.

5. The LGA interconnect of claim 4, wherein said rigid substrate is comprised of metal.

6. The LGA interconnect of claim 2, wherein said insulative member also retains said contact assembly to said substrate.

7. The LGA interconnect of claim 6, wherein said metal contact is comprised of an intermediate base portion with said first and second contact members extending from opposite ends thereof.

8. The LGA interconnect of claim 7, wherein said insulative member is overmolded at said intermediate portion.

9. The LGA interconnect of claim 8, wherein said overmolded insulative member has a head portion larger than said aperture and a shank portion profiled to be received in said aperture.

10. The LGA interconnect of claim 9, wherein said overmolded insulative member is made of plastic material.

11. The LGA interconnect of claim 9, wherein said shank portion comprises a slot profiled to be received in an edge of said substrate, adjacent said aperture.

12. The LGA interconnect of claim 11, wherein the shank portion of said overmolded insulative member is swaged, with said slot in an overlapping position with said edge of said aperture, and said shank portion is deformed against said substrate, retaining said overmolded insulative member and said contact within said aperture.

13. The LGA interconnect of claim 1, wherein said first and second contact members extend as cantilever beams from said insulative member.

14. The LGA interconnect of claim 13, wherein said contact assemblies are arranged on said substrate with said cantilever beams oriented at an angle as measured about an axial centerline through said apertures, which is normal to said substrate.

15. The LGA interconnect of claim 14, wherein said angle is approximately 45 degrees.

16. The LGA interconnect of claim 14, wherein said contact assemblies are arranged in at least two arrays with the cantilever beams extending opposed.

17. The LGA interconnect of claim 16, wherein said at least two arrays are aligned along at least one diagonal line across said substrate.

18. The LGA interconnect of claim 17, wherein said at least two arrays are aligned along plural diagonal lines.

19. The LGA interconnect of claim 16, wherein said contact assemblies are arranged in quadrants, with all cantilever portions projecting generally towards a geometrical center of said substrate.

20. The LGA interconnect of claim 17, wherein each insulative member comprises plural metal contacts positioned therein.

21. The LGA interconnect of claim 20, wherein said insulative member is overmolded around said contacts.

22. The LGA interconnect of claim 21, wherein said insulative member includes interstitial stops intermediate the contacts, to provide a stop member for contacts in another row.

23. The LGA interconnect of claim 22, further comprising overstress stops positioned on said substrate to provide a stop position for said printed circuit board and said chip.

24. The LGA interconnect of claim 1, further comprising a housing member extending around a periphery of said substrate.

25. The LGA interconnect of claim 24, wherein said housing is insulative.

26. The LGA interconnect of claim 25, wherein said substrate is retained to said housing by overmolding said housing around a periphery of said substrate.

27. The LGA interconnect of claim 26, wherein said housing is overmolded in sections.

28. The LGA interconnect of claim 24, wherein said housing member has a substrate receiving surface with a plurality of extending pins, and said substrate has a like plurality of aligning apertures secured over said pins.

29. The LGA interconnect of claim 28, wherein said apertures include openings in a surrounding relationship to said apertures, defining resilient spring edges at said apertures.

30. The LGA interconnect of claim 1, further comprising stop members located along said housing to provide stop positions for said chip.

31. The LGA interconnect of claim 30, wherein said stop members are integrally formed in said housing.

32. The LGA interconnect of claim 31, wherein said stop members are inserts having more rigidity than the material which forms the housing.

33. An LGA interconnect comprising a substrate having an upper surface and a lower surface and a plurality of apertures therethrough arranged in an array, said substrate having housing walls positioned around a periphery of said substrate, and upstanding at least from said upper surface, and a plurality of contact assemblies positioned in said plurality of apertures, each contact assembly comprised of at least one metal contact and an insulative member, the metal contact having a first contact portion projecting above said substrate upper surface, and a second contact portion projecting below said lower surface, said insulative member being positionable in said aperture, isolating said metal contact from said substrate.

34. The LGA interconnect of claim 33, wherein said substrate is comprised of metal.

35. The LGA interconnect of claim 33, wherein said insulative member is overmolded on said metal contact.

36. The LGA interconnect of claim 35, wherein said metal contact is comprised of an intermediate base portion with said first and second contact portions extending from opposite ends thereof.

37. The LGA interconnect of claim 36, wherein said insulative member is overmolded at said intermediate portion.

38. The LGA interconnect of claim 35, wherein said overmolded insulative member has a head portion larger than said aperture and a shank portion profiled to be received in said aperture.

39. The LGA interconnect of claim 38, wherein said overmolded insulative member is made of plastic material.

40. The LGA interconnect of claim 38, wherein said shank portion comprises a transverse slot profiled to be received in an edge of said substrate, adjacent said aperture.

41. The LGA interconnect of claim 40, wherein the shank portion of each said overmolded insulative member is swaged, positioning said slot in an overlapping position with said edge of said aperture, and said shank portion being deformed against said substrate, retaining said overmolded insulative member and said contact within said aperture.

42. The LGA interconnect of claim 33, wherein said housing is overmolded around a periphery of said metal substrate.

43. The LGA interconnect of claim 42, wherein said housing is overmolded in sections.

44. The LGA interconnect of claim 33, wherein said housing has a substrate receiving surface with a plurality of extending pins, and said substrate has a like plurality of aligning apertures secured over said pins.

45. The LGA interconnect of claim 44, wherein said apertures include openings in a surrounding relationship to said apertures, defining resilient spring edges at said apertures.

46. The LGA interconnect of claim 33, wherein said contact assemblies are arranged in at least two arrays with the cantilever beams extending opposed.

47. The LGA interconnect of claim 46, wherein said at least two arrays are aligned along at least one diagonal line across said substrate.

48. The LGA interconnect of claim 47, wherein said at least two arrays are aligned along plural diagonal lines.

49. The LGA interconnect of claim 46, wherein said contact assemblies are arranged in quadrants, with all cantilever portions projecting generally towards a geometrical center of said substrate.

50. The LGA interconnect of claim 47, wherein each insulative member comprises plural metal contacts positioned therein.

51. The LGA interconnect of claim 50, wherein said insulative member is overmolded around said contacts.

52. The LGA interconnect of claim 51, wherein said insulative member includes interstitial stops intermediate the contacts, to provide a stop member for contacts in another row.

53. The LGA interconnect of claim 33, further comprising overstress stops positioned on said substrate to provide a stop position for said contacts.

54. The LGA interconnect of claim 33, further comprising stop members located along said housing to provide stop positions for said chip.

55. The LGA interconnect of claim 54, wherein said stop members are integrally formed in said housing.

56. The LGA interconnect of claim 54, wherein said stop members are inserts having more rigidity than the material which forms the housing.

57. A method of making an array of contacts for interconnecting two planar electrical components, comprising the steps of:

providing a substrate to define a perimeter edge and an array of apertures therethrough;

forming a plurality of metal contacts to each include an intermediate portion, an upper contact portion extending from an upper portion of said intermediate portion and a lower contact portion extending downwardly from said intermediate portion;

positioning said intermediate portions of said metal contacts through said apertures; and

isolating said metal contacts from said substrate.

58. The method of claim 57, wherein said substrate is provided as a rigid substrate.

59. The method of claim 58, wherein said rigid substrate is provided as a metal substrate.

60. The method of claim 57, wherein said metal contacts are isolated from said metal substrate by molding an insulative insert over said intermediate portion.

61. The method of claim 60, wherein said overmolded insert is molded to include a head portion which is larger



than said apertures and a shank portion which is receivable in said apertures.

62. The method of claim 61, wherein said overmolded inserts are held in place in said substrate by swaging said shank portions to enlarge at least a portion of said shank portions to a dimension larger than said aperture.

63. The method of claim 57, wherein the apertures are provided by an etching process.

64. The method of claim 57, further comprising the step of providing a housing in a surrounding relation to said rigid substrate, to surround said upper contact portions.

65. The method of claim 64, wherein said housing is provided by overmolding said housing to said rigid substrate.

66. The method of claim 57, wherein the rigid substrate is retained to the housing by interfering pins on said housing and apertures in said metal substrate.

67. The method of claim 62, wherein said head portion, at the intersection of said shank portion, is provided with a vertically offset portion, whereby when said over-molded insert is positioned in said aperture, said vertically offset portion contacts said substrate.

68. The method of claim 67, wherein said contacts are formed at an angle relative to said substrate, and said contacts are bent away from said vertically offset portion.